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## THE PRIMITIVE STRUCTURE OF THE MANDIBLE IN AMPHIBIANS AND REPTILES

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There has been much uncertainty and doubt as to the structure of the mandible in the early amphibians and reptiles. The abundant material of paleozoic vertebrates in the University of Chicago museum has enabled me to determine beyond reasonable doubt, not only the intimate structure of the pelycosaurian and cotylosaurian mandibles, but also that of a very typical temnospondylous stegocephalian. A full discussion with figures of the various forms in which I have determined the structure will be published in a more extensive work on Permian vertebrates next June. For the present I give only the more essential, newly discovered characters in the cotylosaurian genus *Labidosaurus* and the stegocephalian *Trimerorhachis*, accompanied by figures of the latter. A brief description of the structure in *Dimetrodon* has already been published by me in *Science*.

The coronoid of *Labidosaurus* extends from about the seventh tooth along the alveolar margin to about one inch back of the teeth, appearing on the inner side of the outer wall of the meckelian orifice as a narrow, thin bone. The bone forms the anterior wall of the orifice, joining the prearticular much as it joins the angular in the alligator. The prearticular covers the inner side of the mandible posteriorly much as in *Trimerorhachis*, though not so broadly, and extends forward below the coronoid to about opposite the anterior end of the inframeckelian foramen, where it joins the splenial. The splenial, as usual, enters into the symphysis anteriorly and extends back to the inframeckelian orifice about opposite the last tooth, and forms also part of the inferior margin of that foramen; it is only narrowly visible on the outer side of the mandible.

The arrangement of the elements in *Trimerorhachis* will be shown in the figures better than I can describe them. The coronoid (*cor*), in its relations and position, is almost precisely like that of *Labidosaurus*, except that it is broader anteriorly, and does not extend quite as far forward. It bears the small teeth opposite the posterior dental series. The prearticular (*pa*) is a very broad bone, rather loosely united with the adjacent elements in most of the specimens. Its lower margin posteriorly forms the upper margin of the foramen for the chorda tympani. It borders, as usual, the upper inner margin of the posterior meckelian foramen

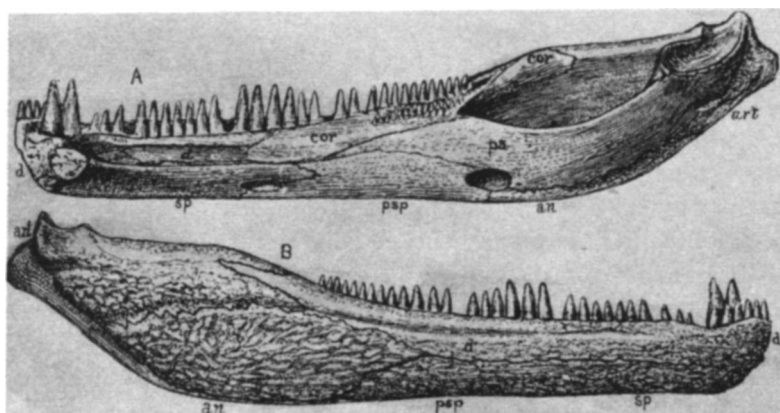


FIG. 1.—Right mandible of *Trimerorhachis alleni* (?) Case, four-ninths natural size: A, from within; B, from without.

and then continues as a slender projection nearly or quite to the hind end of the splenial. The splenial (*sp*) has precisely the same relations anteriorly as in the cotylosaurs and pelycosaurs, entering more or less into the symphysis and extending back to the anterior margin of the anterior meckelian foramen, and beyond it above to a variable extent. These relations are confirmed in some twenty different mandibles. Lying back of this splenial there is another element corresponding to the posterior part of the splenial in *Labidosaurus*, except that it does not extend beyond the posterior meckelian foramen. It overlaps broadly above the anterior end of the prearticular. I propose to call this bone the

*postsplénial*, or, if preferred, the *postopercular*. The presence of this element has been definitely confirmed in *Diplocaulus* by Mr. Herman Douthitt, Fellow in Paleontology of the University of Chicago, who will shortly publish figures and descriptions of the cranium and mandible in this genus.

A bone corresponding to that which I call the splénial has been determined in several stegocephalian mandibles; but under a misapprehension of the true relations of the bones posteriorly it has been called the infradentary, after a corresponding element in certain fishes. There can remain no doubt that it is identical with the bone now known to be characteristic of all primitive reptiles, as I have shown, which is certainly the splénial. It is also quite evident that both these bones, the splénial and post-splénial, correspond to the single splénial in the cotylosaurs and the crocodiles. Were we dealing with modern reptiles only, we should be justified in calling the posterior element the true splénial and the anterior one the infradentary. But we cannot conceive of such an anterior development of the posterior bone in *Labidosaurus* and *Dimetrodon* as I have shown to be the case. It is therefore practically certain that it is the posterior bone which has disappeared in the reptiles. Has it fused with the anterior bone? Or has it entirely disappeared? Whatever may be the case, it is quite evident that the bone requires a new name, which I have given it.

I may add that the sutures shown in the figures of *Trimerorhachis* are based upon a prolonged study of more than forty different mandibles of this genus. The sutures separating the articular from the surangular cannot be distinguished in any one of the forty specimens; that between the prearticular and the coronoid is less certain than the others, in its full extent.